WHAT IS CLAIMED IS:

1. A method for producing optimum design specifications for omni-directional, broadband antennas, comprising the following steps:

providing design criteria for a basic antenna configuration as input to an algorithmic process;

executing said algorithmic process to determine size and position of parasitic elements for combination with said basic antenna configuration to create improved antenna configurations; and

identifying selected of said improved antenna configurations as optimum configurations based on a predetermined combination of selected antenna performance characteristics.

2. A method for producing optimum design specifications for omni-directional, broadband antennas as in claim 1, wherein said design criteria includes at least one of an ideal frequency range of operation and dimensions of wires or of other elements for use in constructing said antenna configurations.

3. A method for producing optimum design specifications for omni-directional, broadband antennas as in claim 1, wherein said step of executing said algorithmic process is successively repeated to create different populations of improved antenna configurations, and wherein selected of said improved antenna configurations comprise combinations of at least two of said basic antenna configurations.

4. A method for producing optimum design specifications for omni-directional broadband antennas as in claim 1, wherein said algorithm process includes calculating the voltage standing wave ratio for selected of said antenna configurations over a selected range of frequencies for antenna operation.

5. A method for producing optimum design specifications for omni-directional broadband antennas as in claim 1, wherein said selected antenna performance characteristics include at least one of input impedance, electric current through said antenna configuration, directivity, and reflection coefficient magnitude.

6. A sleeve monopole antenna as produced by the optimum design specification method of claim 1.

7. A cage sleeve monopole antenna as produced by the optimum design specification method of claim 1.

8. A sleeve dipole antenna as produced by the optimum design specification method of claim 1.

9. A method for designing and producing a sleeve antenna structure characterized by omni-directional capabilities over a generally wide frequency range, comprising:

defining initial antenna parameters and providing a corresponding range of potential values for selected of said initial antenna parameters;

executing a first iteration of an algorithmic process to generate a population of individual antenna designs, such that selected individual antenna designs of said population of individual antenna designs are assigned a fitness value that characterizes selected performance measures of said individual antenna design;

evaluating said population of individual antenna designs and selecting certain of said individual antenna designs as having an optimum fitness value; and

executing at least a second iteration of said algorithmic process to generate an additional population of individual antenna designs with a corresponding fitness value assigned to selected individual antenna designs of said additional population.

10. A method for designing and producing a sleeve antenna structure as in claim 9, wherein said algorithmic process determines the size and location of parasitic elements for positioning around a basic antenna configuration, thereby generating improved antenna designs with greater bandwidth efficiency.

11. A method for designing and producing a sleeve antenna configuration as in claim 9, wherein said algorithmic process includes calculating the electric current in selected of said individual antenna designs.

12. A method for designing and producing a sleeve antenna structure as in claim 9, wherein said selected performance measures include at least one of a voltage standing wave ratio, input impedance, directivity, and reflection coefficient magnitude of selected of said individual antenna designs.

13. A sleeve antenna as produced by the design method of claim 9, wherein said sleeve antenna comprises one of a sleeve monopole antenna and a sleeve dipole antenna.

14. A cage sleeve monopole antenna as produced by the design method of claim 9.

15. A process for enhancing basic antenna configurations to accommodate ideal operation in a wider frequency band, comprising the steps of:

providing a design algorithm for use in accordance with said process for enhancing basic antenna configurations as input to said design algorithm;

providing general antenna parameters and a corresponding range of potential values for selected of said general antenna parameters;

specifying the resolution of selected of said general antenna parameters;

performing a first iteration of said design algorithm to generate a population of individual antenna designs, wherein each individual antenna of said population of individual antenna designs is assigned a fitness value that characterizes selected performance measures of said individual antenna design, and wherein selected of said individual antenna designs are characterized as having a sleeve configuration with a central antenna portion surrounded by a plurality of parasitic elements;

evaluating said fitness values of selected of said individual antenna designs to determine which of said antenna designs are characterized by optimum fitness values; and

performing at least a second iteration of said design algorithm to generate an additional population of individual antenna designs, wherein selected of said individual antenna designs are identified as having a most optimum fitness value.

16. A process for enhancing basic antenna configurations as in claim 15, wherein said general antenna parameters include at least one of frequency range of operation, range of antenna height, and dimensions of wires or of other elements for potential construction of said antenna configurations.

17. A process for enhancing basic antenna configurations as in claim 15, wherein said resolution of selected general antenna parameters is specified as a number of bits per parameter.

18. A process for enhancing basic antenna configurations as in claim 15, wherein said fitness value relates to a bandwidth ratio of highest frequency to lowest frequency

within a selected frequency range of operation for which certain performance criteria are met.

19. A process for enhancing basic antenna configurations as in claim 15, wherein said design algorithm comprises antenna design software for use in conjunction with a computer system.

20. A sleeve antenna configuration as constructed from the process of claim 15, wherein said sleeve antenna comprises one of a sleeve monopole antenna and a sleeve dipole antenna.

21. A helical sleeve antenna configuration as constructed from the process of claim 15.

22. A method for the design of antenna configurations, wherein said antenna configurations are capable of broadband, omni-directional communications operation, comprising:

providing initial design parameters and a range of values corresponding to selected of said initial design parameters, and wherein said initial design parameters include antenna height and frequency range of operation;

executing a first design algorithm that combines selected of said initial design parameters to generate populations of antenna designs, wherein selected antenna designs of said populations of antenna designs are assigned a calculated performance ranking;

executing a second design algorithm that determines the electric current in selected of said antenna designs of said populations of antenna designs;

maintaining an interactive link between said first design algorithm and said second design algorithm such that selected information can be communicated between said first design algorithm and said second design algorithm; and

evaluating selected antenna designs to determine which of said selected antenna designs are characterized by a most desirable performance ranking for a given set of initial design parameters.

23. A method for the design of antenna configurations as in claim 22, wherein said initial design parameters further include the dimensions of the wires or of other elements used to construct said antenna configurations.

24. A method for the design of antenna configurations as in claim 22, wherein selected of said first design algorithm and said second design algorithm calculates the voltage standing wave ratio for selected of said antenna designs for selected frequencies within said frequency range of operation.

25. A method for the design of antenna configurations as in claim 22, further including the step of specifying a resolution for selected of said design parameters, and wherein said resolution is expressed as a number of bits per parameter.

26. A sleeve monopole antenna as produced by the design method of claim 22.

27. A sleeve dipole antenna as produced by the design method of claim 22.

28. A sleeve helical antenna as produced by the design method of claim 22.

29. A method for enhancing the design of broadband cage antennas to facilitate functional operation over a generally wider frequency range, said method comprising the following steps:

providing design criteria for a basic cage antenna configuration and operational conditions thereof;

executing a cage geometry algorithm to generate a plurality of cage antenna designs with improved cage structures that vary from said basic antenna configuration;

assigning a fitness ranking to each of said cage antenna designs that is indicative of selected performance measures of each of said cage antenna designs and that facilitates the characterization of selected of said cage antenna designs as optimum for certain applications.

30. A method for enhancing the design of broadband cage antennas as in claim 29, wherein said design criteria includes at least one of frequency range of operation, number of wires used to construct said basic cage antenna configuration and size of wires used in said basic cage antenna configuration.

31. A method for enhancing the design of broadband cage antennas as in claim 29, wherein each of said improved cage structures has corresponding dimensions, including a specific diameter of said improved cage structure and a specific length of selected wires for use in each of said improved cage structures.

32. A method for enhancing the design of broadband cage antennas as in claim 29, wherein said cage geometry algorithm includes solving an integral equation to

determine the electric current in selected of said improved cage structures and calculating the voltage standing wave ratio for selected of said improved cage structures.

33. A method for enhancing the design of broadband cage antennas as in claim 32, wherein said fitness ranking is a function of a bandwidth ratio of a highest frequency in a selected frequency range of operation to a lowest frequency in said selected frequency range of operation such that said voltage standing wave ratio is within a specified range.

34. A cage monopole antenna as produced by the design method of claim 29.

35. A method for enhancing the design of broadband cage antennas as in claim 29, further comprising the following additional steps:

selecting certain of said cage antenna designs of said plurality of cage antenna designs as characterized by an optimum fitness ranking under selected of said operational conditions thereof;

executing a sleeve geometry algorithm to determine parameters of parasitic elements for combination with selected of said cage antenna designs to generate a plurality of sleeve cage antenna designs; and

assigning a fitness ranking to each of said sleeve cage antenna designs that is indicative of selected performance measures of each of said sleeve cage antenna designs and that facilitates the characterization of selected of said sleeve cage antenna designs as optimum for certain applications.

36. A method as in claim 35, wherein said parameters of said parasitic elements include the length of said parasitic elements and the distance between selected of parasitic elements and said cage antenna structure.

37. A method as in claim 35 wherein selected of said cage geometry algorithm and said sleeve geometry algorithm calculates the voltage standing wave ratio for selected of said cage antenna designs for a plurality of different operating frequencies within a specified range of frequencies.

38. A method as in claim 35 wherein said fitness ranking is a function of a bandwidth ratio defined by a highest frequency of operation within a specified range of frequencies to a lowest frequency of operation within said specified range of frequencies such that said voltage standing wave ratio is within a specified range.

39. A sleeve helix antenna as produced by the design method of claim 35.

40. A cage sleeve monopole antenna as produced by the design method of claim 35.

41. A method for use in determining the electronic current in omni-directional antenna designs, comprising:

defining initial antenna parameters and providing a corresponding range of potential values for selected of said initial antenna parameters;

determining a system of impedance equations to represent the impedance of a curved antenna structure;

reducing the number of unknown variables in said system of impedance equations such that the calculation time to determine said electronic current in said curved antenna structure is significantly reduced; and

computing the electronic current in said curved antenna structure.

42. A method as in claim 41, wherein said initial antenna parameters include a range of ideal frequencies for operation of said curved antenna structure.

43. A method as in claim 42, further including calculating the voltage standing wave ratio for selected frequencies in said range of ideal frequencies.

44. An omni-directional sleeve antenna for use in broadband communications applications, comprising:

a central conductive characterized by a first end and a second end, and wherein said first end is driven at a ground reference plane and said second end is positioned relative to said first end such that said central conductive element extends in a generally perpendicular fashion to said ground reference plane and said first end; and

a plurality of parasitic elements positioned around said center conductive element and extending in a generally perpendicular fashion from said ground reference plane, wherein the distance between each parasitic element of said plurality of parasitic elements and said first end of said central conductive element is generally equivalent and wherein the length of each of said parasitic elements is generally equivalent; and

wherein the combination of said central conductive element with said plurality of parasitic elements yields an antenna structure that operates in a wider frequency range

than would said conductive element without combination with said plurality of parasitic elements.

45. An omni-directional sleeve antenna for use in broadband communications applications as in claim 43, wherein said central conductive element may comprise on of a straight wire, curved wire, wire loop and helical structure.

46. An omni-directional sleeve antenna for use in broadband communications applications as in claim 44, wherein said parasitic elements correspond to straight wire structures that extend from said ground reference plane such that each of said straight wire structures is generally parallel to other of said straight wire structures.

47. An omni-directional sleeve antenna for use in broadband communications applications as in claim 46, wherein each of said straight wire structures is characterized by a top end and a bottom end and wherein said bottom end is positioned relative to said ground reference plane and wherein said top end extends away from said ground reference plane and said bottom end, and wherein the distance from said top end to said bottom end of each of said straight wire structured parasitic elements is generally less than the distance from said first end to said second end of said central conductive element.

48. An omni-directional sleeve antenna for use in broadband communications applications as in claim 44, wherein said central conductive element is split to effect operation of said omni-directional sleeve antenna as a dipole antenna.

49. An omni-directional sleeve antenna for use in broadband communications applications as in claim 44, wherein said distance between each parasitic element of said plurality of parasitic elements and said first end of said central conductive element and said length of each of said parasitic elements are optimized via a design algorithm to achieve increased bandwidth and low voltage standing wave ratio.

50. A sleeve cage antenna for use in wide-band communications applications, wherein said sleeve cage antenna is capable of transmitting and/or receiving electromagnetic radiation in an omni-directional fashion, comprising:

a conductive stalk positioned generally perpendicular to a ground plane and for electrical connection to a transmission medium, wherein said conductive stalk is characterized by a top end that extends away from said ground plane;

a first stabilizing element constructed with a plurality of conductive strips, and wherein selected of said conductive strips extend from a first common location to a plurality of first extended locations, and wherein the length of each selected said conductive strip from said first common location to each selected of said first extended locations is generally equivalent, and wherein said first common location of said first stabilizing element is connected to said top end of said conductive stalk;

a second stabilizing element constructed with an additional plurality of conductive strips, and wherein selected of said conductive strips extend from a second common location to a plurality of second extended locations in the same fashion as said first stabilizing element, and wherein the number of said first extended locations of said first stabilizing element and the number of said second extended locations of said second stabilizing element is the same;

a plurality of cage wire elements for connecting said first stabilizing element to said second stabilizing element and wherein each cage wire element of said plurality of cage wire elements extends from a selected of said first extended locations to a selected of said second extended locations, and wherein the combination of said plurality of cage wire elements, said first stabilizing element and said second stabilizing element form a cage structure for said sleeve cage antenna; and

a parasitic assembly positioned around said cage structure relative to said ground plane, wherein the distances from selected points of said parasitic assembly to said conductive stalk are generally equivalent.

51. A sleeve cage antenna for use in wide-band communications applications as in claim 50, wherein said parasitic assembly is embodied by a plurality of straight wire structures that extend from said ground plane such that selected of said straight wire

structures are generally parallel to other selected of said straight wire structures and wherein the distance that each of said straight wire structures extends from said ground plane is generally equivalent.

52. A sleeve cage antenna for use in wide-band communications applications as in claim 50, wherein said plurality of cage wire elements correspond to a plurality of straight parallel wires such that said cage structure corresponds to a cage monopole configuration.

53. A sleeve cage antenna for use in wide-band communications applications as in claim 50, wherein said plurality of cage wire elements correspond to a plurality of curved wires such that said cage structure corresponds to a multifilar helical configuration.

54. A sleeve cage antenna for use in wide-band communications applications as in claim 50, wherein said pluralities of conductive strips for constructing said first and second stabilizing elements are made of brass.

55. A sleeve cage antenna for use in wide-band communications applications as in claim 50, wherein the number of said first extended locations, said second extended locations and said plurality of cage wire elements is four, resulting in a quadrifilar cage structure.

56. A sleeve cage antenna for use in wide-band communications applications as in claim 50, wherein the width of said cage wire elements and the width of said conductive strips for forming said first and second stabilizing elements are such that said cage wire elements and said conductive strips are electrically equivalent.

57. A sleeve cage antenna for use in wide-band communications applications as in claim 50, wherein the distance from said first common location to selected of said first extended locations, the distance from said second common location to selected of said second extended locations, and the distance between said first stabilizing element and said second stabilizing element are optimized via a design algorithm to achieve increased bandwidth and low voltage standing wave ratio.

58. A sleeve cage antenna for use in wide-band communications applications as in claim 50, wherein the distance from selected points of said parasitic assembly to said conductive stalk and the length that said parasitic assembly extends from said ground

plane are optimized via a design algorithm to achieve increased bandwidth and low voltage standing wave ratio.